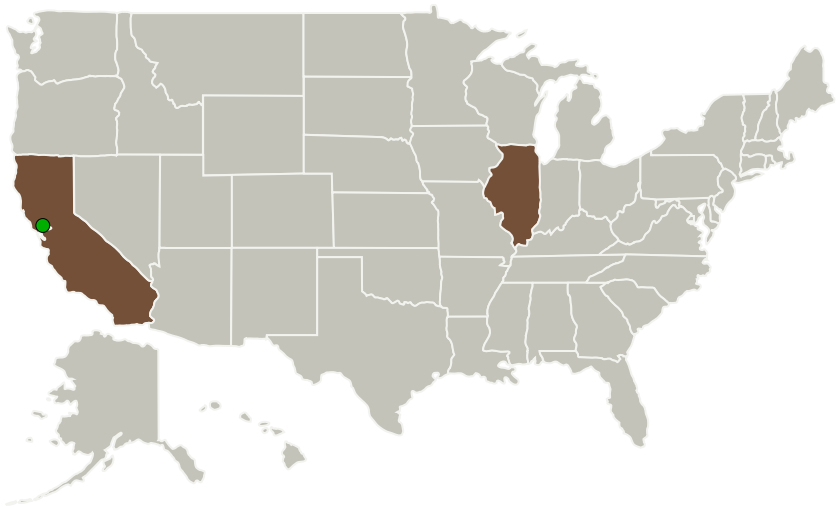
Aromatic Thermosetting Copolyesters for Ablative TPS, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

Better performing ablative thermal protection systems than currently available are needed to satisfy requirements of the most severe crew exploration vehicles, such as the Mars Sample Return with 12-15 km/s Earth entry. The primary objective of CU Aerospace's Phase I work will be to fabricate and test aromatic thermosetting copolyesters (ATSP) composites for use as ablatives in next generation spacecraft missions. The synthetic development of novel aromatic thermosetting copolyesters was a major innovation in the field of polymer science. Previous testing of their capabilities showed excellent performance as adhesives, rigid foams, matrices for composites, and dielectrics for microelectronics. Only recently has this material been considered as a viable ablative due to its high temperature stability and excellent composite mechanical properties especially due to the liquid crystalline nature of the polymer, which allows a matching of CTE between fiber and matrix. Our team partner the University of Illinois at Urbana-Champaign will assist CU Aerospace to perform basic research and provide technical support to accelerate the transition of ATSP polymers into ablative composites. If successful CU Aerospace envisions the ATSP to be utilized in a wide variety of applications in both civilian and military spacecraft, either as a retrofit or as a next-generation design.

Primary U.S. Work Locations and Key Partners



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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
CU Aerospace, LLC	Lead Organization	Industry	Champaign, Illinois
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Illinois

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138822)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

CU Aerospace, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

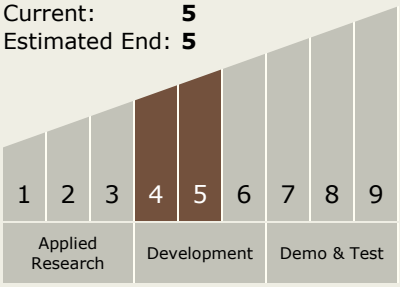
Carlos Torrez

Principal Investigator:

Chris Mangun

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.1 Aeroassist and Atmospheric Entry
    - TX09.1.1 Thermal Protection Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System